REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claims 5 and 6 have been withdrawn from consideration. Claims 1-4 remain active in the application.

Briefly, the claimed invention is directed to a vehicle operation control method and apparatus for controlling an actual steering angle of driven wheels based on a steering angle of a steering wheel and a vehicle velocity. Conventionally, the control of the actual steering angle of driven wheels based on a steering angle of a steering wheel and a vehicle velocity suffered from the shortcoming that abrupt changes in vehicle velocity could result in changes in the steering gear ratio, even when the steering wheel is maintained at a specific angle, thereby producing under-steer or over-steer (paragraph [0008]).

According to a feature of the invention set forth in the claims, the control of the actual steering angle of the steering wheel is based upon an integration of the product of the *change amount in the steering angle* with a variable gain based on vehicle velocity. Since the steering angle control is based upon the integration of the product of a variable gain with a *change amount* in the steering angle, this product will be zero where the steering angle is unchanged and so will not affect the control of the actual steering angle, thereby avoiding the problems inherent in the prior art (paragraph [0012]). For example, referring to the nonlimiting embodiment described in the specification and particularly Figures 3 and 5, step S107 (variable gain multiplying means 40a2) multiplies a change amount $\Delta\theta h$ in the steering angle θh with a gear ratio Ga based upon vehicle velocity (paragraphs [0036]-[0037]). Because the gear ratio Ga is multiplied only with the *change* amount $\Delta\theta h$, no change occurs in the steering angle when the steering wheel is kept constant ($\Delta\theta h$ is zero).

Claims 1 and 3 were rejected under 35 U.S.C. §103 as being obvious over U.S. patent 4,718,685 (Kawabe et al.). The Examiner there recognized that Kawabe et al. "does not

explicitly teach using the change amount of the steering angle and does not explicitly teach integrating the results of the multiplication" but alleged that this would have been obvious to those skilled in the art. In fact, there is no basis for the Examiner's allegation of obviousness for these features.

Kawabe et al. is concerned with controlling the rear wheels of a four wheel steered vehicle. It therefore calculates a desired rear wheel steer angle value δ_R (column 3, lines 60-62). δ_R is determined using equations 6-12 (columns 6-7), one of the parameters of which is the front wheel steer angle value δ_{F2} (column 7, lines 27-28). Parameters Kf and Kr are wheel cornering powers (col. 5, lines 3-7) and not variable gains.

Claim 1 recites a first step of obtaining a change amount in the steering angle by the steering wheel, and a third step of multiplying the change amount in the steering angle with a speed dependent variable gain. Claim 3 recites a steering angle change amount obtaining means and a multiplying means for multiplying the change amount in the steering angle with the variable gain. As the Examiner has recognized, *Kawabe et al. does not teach obtaining or multiplying a change amount in the steering angle*, but instead merely uses the value δ_{F2} of the steering angle of the front wheels in calculating the desired rear wheel steer angle value δ_R. Additionally, Kawabe et al. teaches a complex device which uses subsections 21 and 22 for solving vehicle models, which impose the calculation of complicated equations (1) to (15) (col. 6, lines 29-34). The present invention avoids these complexities of the prior art.

Nonetheless, the Examiner implies that using the change amount would have been inherent or obvious to those skilled in the art because "Kawabe obviously encompasses teaching the change of the steering angle with respect to the neutral position." Applicants respectfully submit that this alleged inherency or motivation for the detection and multiplication of a *change amount* in the steering angle, rather than the value of the steering angle, *per se*, is without foundation.

The Examiner alleged that Kawabe et al. "encompasses" teaching a change in the steering angle because it was "well known that the steering angle sensor determines the steering angle relative to the neutral position." The Examiner's reasoning therefore appears to be that: (1) because the value of the steering position is determined relative to a neutral position, its change is also inherently determined by, or obvious from, the detection of the positional value, and (2) it would have been obvious to have instead used the change amount in the steering angle for the calculation of the desired rear wheel steer angle value δ_R. However, it is evident that this analysis has a number of flaws.

First, simply because a positional value of a steering angle may be determined relative to a neutral position does not inherently "encompass" or render obvious a step of detecting a change of the steering angle with respect to the neutral position. Obtaining a value of a *change* in the steering angle relative to the neutral position requires additional calculations producing at least two timewise separated detections of the steering angle relative to the neutral position and subtracting a difference between the two. These additional calculations are not "encompassed" in the mere detection of the steering angle, *per se*, and would not have been obvious to those skilled in the art absent a motivation to do so.

The second flaw is that there is no motivation for those skilled in the art to have modified the processing in Kawabe et al. to obtain or multiply a *change amount* in the steering angle and use the change amount for calculating a steering angle. Equations 6-12 of Kawabe et al. indicate that the value of the front wheel steering angle is used in calculating the desired rear wheel steer angle value δ_R. But there is no teaching in Kawabe et al. that the value of a change in the front wheel steering angle provides any utility for the calculation of the desired rear wheel steer angle value δ_R. In the absence of a teaching in Kawabe et al. of utility for a change amount in the detected front wheel steering angle, those skilled in the art

would not have been motivated to perform the additional calculations required to obtain or multiply such a change amount.

The Examiner has also correctly noted that Kawabe et al. fails to teach the claimed integration of the product of the change amount of the steering angle with a variable gain based upon vehicle speed. Instead the Examiner has noted that Kawabe et al. teaches performing integration on certain other vehicle parameters (column 6, lines 29-34 and column 7, lines 43-47). However, these integrations are disclosed as being performed in order to calculate δ_R, and the value V_y which is used to calculate δ_R. There is no description that the product of δ_R and a speed dependent gain value should be integrated to obtain a steering angle value. The mere description in Kawabe et al. of integration of other variables would not have motivated those skilled in the art to have integrated the product of the uncalculated *change in* δ_R with a speed dependent gain value since there is no teaching of any utility fro such a further integration.

Accordingly, Kawabe et al. does not disclose obtaining and multiplying a change amount in the steering angle or integrating the product of the change amount and a speed dependent gain value. Instead, Kawabe et al. uses the front steering angle value itself and so is subject to control variations at constant steering angle values. Moreover, there is no motivation in the reference for those skilled in the art to modify Kawabe et al. to obtain and use a change amount in the steering angle, and so the claims clearly define over this reference.

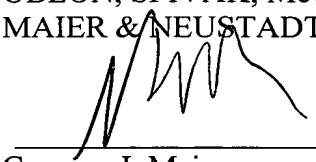
Concerning paragraph 4 of the Office Action, it is noted that U.S. patent 6,302,441 (Kawamuro et al.) was cited to teach the feature of the dependent claims that the variable gain is a transmission ratio. Kawamuro et al. is otherwise insufficient to overcome the shortcomings of Kawabe et al. as discussed above, and so no combination of the above references would anticipate or render obvious the subject matter of any of the claims.

The Abstract of the Disclosure has been revised as required in paragraph 1 of the Office Action.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early notice of allowability.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599

Robert T. Pous
Registration No. 29,099

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 06/04)
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